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Report on the individual review of the annual submission of Belgium submitted in 2014*

* In the symbol for this document, 2014 refers to the year in which the inventory was submitted, and not to the year of publication.

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I. Introduction and summary

1. This report covers the review of the 2014 annual submission of Belgium, coordinated by the UNFCCC secretariat, in accordance with the "Guidelines for review under Article 8 of the Kyoto Protocol" (decision 22/CMP.1) (hereinafter referred to as the Article 8 review guidelines). The review took place from 8 to 13 September 2014 in Bonn, Germany, and was conducted by the following team of nominated experts from the UNFCCC roster of experts: generalists – Mr. Tinus Pulles (Netherlands) and Ms. Kristina Saarinen (Finland); energy – Mr. Ricardo Fernandez (European Union), Mr. Akira Osako (Japan) and Mr. Moshe Yanai Axelrod (Israel); industrial processes and solvent and other product use – Mr. Joseph Amankwa Baffoe (Ghana) and Mr. Jacek Skoskiewicz (Poland); agriculture – Ms. Janka Szemesová (Slovakia) and Mr. Marcelo Theoto Rocha (Brazil); land use, land-use change and forestry (LULUCF) – Ms. Maria Fernanda Alcobé (Argentina), Mr. Matthew Searson (Australia) and Mr. Richard Volz (Switzerland); and waste – Mr. Eduardo Calvo (Peru) and Mr. Igor Ristovski (the former Yugoslav Republic of Macedonia). Ms. Saarinen and Mr. Theoto Rocha were the lead reviewers. The review was coordinated by Ms. Astrid Olsson (UNFCCC secretariat).

2. In accordance with the Article 8 review guidelines, a draft version of this report was sent to the Government of Belgium, which provided comments that were considered and incorporated, as appropriate, into this final version of the report. All encouragements and recommendations in this report are for the next annual submission, unless otherwise specified.

3. All recommendations and encouragements included in this report are based on the expert review team's (ERT's) assessment of the 2014 annual submission against the Article 8 review guidelines. The ERT has not taken into account the fact that Parties will prepare the submissions due by 15 April 2015 using the revised "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual greenhouse gas inventories" adopted through decision 24/CP.19. Therefore, when preparing the next annual submissions, Parties should evaluate the implementation of the recommendations and encouragements in this report, in the context of those guidelines.

4. In 2012, the main greenhouse gas (GHG) emitted by Belgium was carbon dioxide (CO_2), accounting for 86.4 per cent of total GHG emissions[1] expressed in CO_2 equivalent (CO_2 eq), followed by nitrous oxide (N_2O) (6.0 per cent) and methane (CH_4) (5.5 per cent). Hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6) collectively accounted for 2.1 per cent of the overall GHG emissions in the country. The energy sector accounted for 81.0 per cent of total GHG emissions, followed by the industrial processes sector (9.6 per cent), the agriculture sector (7.9 per cent), the waste sector (1.3 per cent) and the solvent and other product use sector (0.2 per cent). Total GHG emissions amounted to 116,520.32 Gg CO_2 eq and decreased by 19.4 per cent between the base year[2] and 2012. The ERT concluded that the description in the national inventory report (NIR) of the trends for the different gases and sectors is reasonable, with the exception of land converted to cropland and settlements (see paras. 67 and 68 below).

[1] In this report, the term "total GHG emissions" refers to the aggregated national GHG emissions expressed in terms of carbon dioxide equivalent excluding LULUCF, unless otherwise specified.

[2] "Base year" refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. The base-year emissions include emissions from sources included in Annex A to the Kyoto Protocol only.

5. Tables 1 and 2 show GHG emissions from sources included in Annex A to the Kyoto Protocol (hereinafter referred to as Annex A sources), emissions and removals from the LULUCF sector under the Convention and emissions and removals from activities under Article 3, paragraph 3, and, if any, elected activities under Article 3, paragraph 4, of the Kyoto Protocol (KP-LULUCF), by gas and by sector and activity, respectively.

6. Information to be included in the compilation and accounting database can be found in annex I to this report.

Table 1

Greenhouse gas emissions from Annex A sources and emissions/removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol by gas, base year[a] to 2012

			Gg CO_2 eq								*Change (%)*
		Greenhouse gas	*Base year*	*1990*	*1995*	*2008*	*2009*	*2010*	*2011*	*2012*	*Base year–2012*
Annex A sources		CO_2	118 988.82	118 988.82	124 323.62	119 452.55	106 827.26	113 429.21	104 270.66	100 659.38	–15.4
		CH_4	9 659.08	9 659.08	9 256.12	6 656.80	6 580.66	6 661.32	6 465.84	6 392.29	–33.8
		N_2O	10 900.18	10 900.18	11 720.60	7 582.21	7 670.66	8 328.81	7 037.19	6 991.32	–35.9
		HFCs	448.71	NA, NO	448.71	1 838.93	1 916.35	1 999.48	2 076.45	2 140.19	377.0
		PFCs	2 335.24	1 753.32	2 335.24	202.08	115.87	85.56	179.03	220.12	–90.6
		SF_6	2 242.59	1 650.72	2 242.59	90.91	97.72	106.56	116.34	117.00	–94.8
KP-LULUCF	Article 3.3[b]	CO_2				242.29	224.28	212.71	200.74	188.73	
		CH_4				NO	NO	NO	NO	NO	
		N_2O				2.06	2.23	2.41	2.59	2.78	
	Article 3.4[c]	CO_2	NA			NA	NA	NA	NA	NA	NA
		CH_4	NA			NA	NA	NA	NA	NA	NA
		N_2O	NA			NA	NA	NA	NA	NA	NA

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable, NO = not occurring.

[a] The base year for Annex A sources refers to the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[b] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

[c] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation.

Table 2
Greenhouse gas emissions by sector and activity, base year[a] to 2012

			Gg CO_2 eq								*Change (%)*
		Sector	*Base year*	*1990*	*1995*	*2008*	*2009*	*2010*	*2011*	*2012*	*Base year–2012*
Annex A sources		Energy	112 294.38	112 294.38	116 337.91	110 532.60	100 596.84	106 866.22	97 286.67	94 399.76	–15.9
		Industrial processes	17 390.05	15 767.55	19 264.40	13 910.94	11 270.10	12 283.65	11 697.30	11 172.85	–35.8
		Solvent and other product use	204.40	204.40	192.64	183.74	183.47	183.12	183.13	182.88	–10.5
		Agriculture	11 439.45	11 439.45	11 534.07	9 395.78	9 505.86	9 584.27	9 438.74	9 256.53	–19.1
		Waste	3 246.34	3 246.34	2 997.87	1 800.43	1 652.24	1 693.68	1 539.67	1 508.30	–53.5
		LULUCF	NA	–834.40	–656.51	–1 166.32	–1 244.04	–1 265.96	–1 167.59	–1 381.26	NA
		Total (with LULUCF)	**NA**	**142 117.73**	**149 670.37**	**134 657.17**	**121 964.48**	**129 344.98**	**118 977.93**	**115 139.06**	**NA**
		Total (without LULUCF)	**144 574.63**	**142 952.13**	**150 326.89**	**135 823.49**	**123 208.52**	**130 610.94**	**120 145.51**	**116 520.32**	**–19.4**
		Other[b]	NO	NO	NO	NO	NO	NO	NO	NO	NO
KP-LULUCF	Article 3.3[c]	Afforestation and reforestation				–261.32	–272.79	–284.31	–295.86	–307.45	
		Deforestation				505.67	499.31	499.43	499.19	498.95	
		Total (3.3)				**244.35**	**226.51**	**215.12**	**203.33**	**191.50**	
	Article 3.4[d]	Forest management				NA	NA	NA	NA	NA	
		Cropland management	NA			NA	NA	NA	NA	NA	NA
		Grazing land management	NA			NA	NA	NA	NA	NA	NA
		Revegetation	NA			NA	NA	NA	NA	NA	NA
		Total (3.4)	**NA**			**NA**	**NA**	**NA**	**NA**	**NA**	**NA**

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NA = not applicable, NO = not occurring.

[a] The base year for Annex A sources is the base year under the Kyoto Protocol, which is 1990 for CO_2, CH_4 and N_2O, and 1995 for HFCs, PFCs and SF_6. For activities under Article 3, paragraph 3, of the Kyoto Protocol and forest management under Article 3, paragraph 4, only the inventory years of the commitment period must be reported.

[b] Emissions/removals reported in the sector other (sector 7) are not included in Annex A to the Kyoto Protocol and are therefore not included in national totals.

[c] Activities under Article 3, paragraph 3, of the Kyoto Protocol, namely afforestation and reforestation, and deforestation.

[d] Elected activities under Article 3, paragraph 4, of the Kyoto Protocol, including forest management, cropland management, grazing land management and revegetation.

II. Technical assessment of the annual submission

A. Overview

1. Annual submission and other sources of information

7. The 2014 annual submission was submitted on 10 April 2014; it contains a complete set of common reporting format (CRF) tables for the period 1990–2012 and an NIR. Belgium also submitted the information required under Article 7, paragraph 1, of the Kyoto Protocol, including information on: activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, accounting of Kyoto Protocol units, changes in the national system and in the national registry and the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol. The standard electronic format (SEF) tables were submitted on 10 April 2014. The annual submission was submitted in accordance with decision 15/CMP.1.

8. Belgium submitted revised emission estimates of SF_6 emissions from industrial processes for the years 1990 to 2008 on 13 September 2014 in response to questions raised by the ERT during the review. The values used in this report are those submitted by Belgium on 13 September 2014.

9. The list of other materials used during the review is provided in annex II to this report.

2. Question(s) of implementation raised in the 2013 annual review report

10. The ERT noted that no questions of implementation have been raised in the 2013 annual review report.

3. Overall assessment of the inventory

11. Table 3 contains the ERT's overall assessment of the annual submission of Belgium. For recommendations for improvements for specific categories, please see the paragraphs cross-referenced in the table.

Table 3
The expert review team's overall assessment of the annual submission

Issue	*Expert review team assessment*	*General findings and recommendations*
The ERT's findings on completeness		
Annex A sources[a]	Complete	Mandatory: none
		Non-mandatory: none
Land use, land-use change and forestry[a]	Complete	Mandatory: none
		Non-mandatory: none
KP-LULUCF	Complete	
The ERT's findings on recalculations and time-series consistency		Sufficiently transparent, except for the agriculture sector
Transparency of	Not sufficiently transparent	Please see paragraph 49 below for category-

Issue	*Expert review team assessment*	*General findings and recommendations*
recalculations		specific findings
Time-series consistency	Not sufficiently consistent	Please see paragraph 37 below for category-specific findings
The ERT's findings on QA/QC procedures	Not sufficient	Owing to the governmental structure in Belgium, the harmonization of the inventories prepared by the three regions into one single national inventory at the federal level leads to significant problems in QA/QC across various sectors of the inventory Please see paragraphs 12 and 22 below for category-specific recommendations
The ERT's findings on transparency	Not sufficiently transparent	Owing to the governmental structure in Belgium, the harmonization of the inventories prepared by the three regions into one single national inventory at the federal level leads to significant problems in transparency Please see paragraphs 22, 35, 52, 56, 57, 58 and 73 below for category-specific recommendations

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, ERT = expert review team, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, QA/QC = quality assurance/quality control.

[a] The assessment of completeness by the ERT considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the Intergovernmental Panel on Climate Change (IPCC) *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, the IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* or the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*).

12. In the 2013 annual review report,[3] the ERT concluded that no improvements to the 2010 quality assurance/quality control (QA/QC) plan had been reported in the 2013 NIR and reiterated the recommendation from the 2012 annual review report[4] that Belgium improve its QA/QC procedures. In the 2014 annual submission, the ERT identified that Belgium still uses its 2010 QA/QC plan and found no clear text explaining whether the QA/QC procedures have indeed been improved. In response to a question raised by the ERT during the review, Belgium indicated that many improvements have been made in response to this recommendation. However, the Party acknowledged that the improvements in this regard were not reported as such in section 1.6 of the NIR (information on the QA/QC plan) or in the QA/QC plan itself. The ERT recommends that Belgium ensure that any improvements to the QA/QC procedures are reflected in the actual QA/QC plan itself. Minor changes could be included as an addendum or a corrigendum to that document. In response to a related follow-up question, the Party stated that it is committed to including the improvements in a new version of the QA/QC plan for the annual submission, as well as in section 1.6 of the NIR, and to continuing to apply these procedures for future annual submissions. The ERT further encourages Belgium to include in the updated QA/QC plan

[3] FCCC/ARR/2013/BEL, paragraph 13.
[4] FCCC/ARR/2012/BEL, paragraph 24.

specific procedures that provide guidance on how to change the QA/QC procedures in the plan.

4. Description of the institutional arrangements for inventory preparation, including the legal and procedural arrangements for inventory planning, preparation and management

Inventory planning

13. The NIR described the national system for the preparation of the inventory. As indicated by the Party in its NIR, there were no changes to the inventory planning process. The description of the inventory planning process, as contained in the report of the individual review of the annual submission of Belgium submitted in 2013,[5] therefore remains relevant.

14. The ERT recognizes the difficulties that result from the fact that Belgium is a federal state comprising three regions: the Brussels-Capital Region, the Flemish Region and the Walloon Region, each of which prepares its own regional inventory, as a consequence of the specific responsibilities assigned to the regional and federal government levels. The Belgian Interregional Environment Agency (IRCEL-CELINE) combines the three regional inventories into the national inventory. The ERT notes that the national energy demand statistics are calculated at the federal level by the federal energy administration (Energy Observatory of the Federal Public Service Energy). These two processes seem to occur independently, leading to inconsistencies between the reported activity data (AD) and the associated emissions. Examples of such inconsistencies occur in the iron and steel industry, where the reporting of emissions in the energy sector and the industrial processes sector is not treated equally in the three regions and between the inventory and the national energy statistics. In the waste sector, the three regions use different approaches to report CH_4 emissions from solid waste disposal sites. The ERT encourages Belgium to further intensify the efforts to resolve this issue by ensuring that aggregation at the federal level of both the regional emission inventories and the statistical data are streamlined in a coordinated process.

Inventory preparation

15. Table 4 contains the ERT's assessment of Belgium's inventory preparation process. For improvements related to specific categories, please see the paragraphs cross-referenced in the table.

Table 4
Assessment of inventory preparation by Belgium

Issue	*ERT assessment*	*ERT findings and recommendations*
Key category analysis		
Was the key category analysis performed in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF?	Yes	Level and trend analysis performed, including LULUCF
Approach followed?	Tier 1	The ERT encourages Belgium to use a tier 2 method in

[5] FCCC/ARR/2013/BEL, paragraphs 11–13.

Issue	*ERT assessment*	*ERT findings and recommendations*
		addition to a tier 1 method
Were additional key categories identified using a qualitative approach?	No	
Has the Party identified key categories for activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol following the guidance on establishing the relationship between the activities under the Kyoto Protocol and the associated key categories in the UNFCCC inventory?	Yes	
Does the Party use the key category analysis to prioritize inventory improvements?	Yes	
Assessment of uncertainty analysis		
Approach followed?	Tier 1	In the Flemish Region, a complete uncertainty study was conducted in 2004, both at the tier 1 and the tier 2 level. The results of this study are used for an annual update of the tier 1 uncertainty analysis
Was the uncertainty analysis carried out in accordance with the IPCC good practice guidance and the IPCC good practice guidance for LULUCF?	Yes	
Quantitative uncertainty (including LULUCF)	Level = 5.35% Trend = 2.35%	
Quantitative uncertainty (excluding LULUCF)	Not provided	The ERT encourages Belgium to perform and report the uncertainty analysis without the LULUCF sector, as carried out in previous annual submissions

Abbreviations: ERT = expert review team, IPCC good practice guidance = Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, IPCC good practice guidance for LULUCF = IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*, LULUCF = land use, land-use change and forestry.

16. The national inventory of Belgium (both the CRF tables and the NIR) is compiled by three independent regional inventory teams and the national inventory is produced by combining these three inventories into one submission. For several categories there are inconsistencies between the three regional inventories (see paras. 22, 23, 50, 61 and 73 below), which, in the view of the ERT, could and should be avoided. The ERT recommends that Belgium examine whether the inventory for a specific region, for categories where a

tier 1 default method is used, could be improved by using the implied emission factor (IEF) for the same category in other region(s) as a country-specific emission factor (EF) for that category. This could both improve the consistency of the national inventory and raise the method used to the tier 2 level for all regions.

Inventory management

17. There were no changes to the inventory management process carried out by the Party for the 2014 annual submission, as indicated by Belgium in its NIR. The description of the inventory management process, as contained in the report of the individual review of the annual submission of Belgium submitted in 2013,[6] remains relevant.

5. Follow-up to previous reviews

18. Recommendations from previous reviews that have not yet been implemented, as well as issues the ERT identified during the 2014 annual review, are discussed in the relevant sectoral chapters of the report and in table 9 below.

B. Energy

1. Sector overview

19. The energy sector is the main sector in the GHG inventory of Belgium. In 2012, emissions from the energy sector amounted to 94,399.76 Gg CO_2 eq, or 81.0 per cent of total GHG emissions. Since 1990, emissions have decreased by 15.9 per cent. The key drivers for the fall in emissions are: the lower consumption of solid fuels in the iron and steel industry due to a change from basic oxygen furnaces to electric arc furnaces; the switch from solid fuels to gaseous fuels in public electricity and heat production; and the technological improvements in the combined heat and power installations. Within the sector, 26.6 per cent of the emissions were from other sectors, followed by 26.4 per cent from transport, 24.2 per cent from energy industries and 22.2 per cent from manufacturing industries and construction. Fugitive emissions from oil and natural gas accounted for 0.5 per cent of emissions and fugitive emissions from solid fuels and from other each accounted for less than 0.1 per cent of emissions.

20. Belgium has made recalculations between the 2013 and 2014 annual submissions for this sector. The most significant recalculations between the 2013 and 2014 annual submissions were in the following category: CO_2 emissions from other sectors for the period 2002–2011. The recalculations were made following a correction in AD; namely, the relocation of fuel for household heating from fuel oil to natural gas. Compared with the 2013 annual submission, the recalculations decreased emissions in the energy sector by 411.60 Gg CO_2 eq (0.4 per cent) and decreased total national emissions by 0.3 per cent. The recalculations were adequately explained. In response to a reiterated strong recommendation made in the previous review report, Belgium quantified and justified the recalculations in the 2014 annual submission. The recalculations were explained by using tables showing the emission differences of the three regions from previous estimates for 1990, 1995, 2000, 2005 and from emissions for 2006–2011, for each subcategory from energy industries to other (energy). The ERT commends the Party's effort in this improvement.

21. The ERT notes that the long period of time between the provisional and final energy balances results in regular recalculations in the annual submission for the following year. In response to a question raised by the ERT during the review, the Party explained that the

[6] FCCC/ARR/2013/BEL, paragraph 16.

"final regional energy balances for the year X are usually available in July year X+2 (Brussels-Capital, Wallonia and Flanders) but the formal approval can occur later (for instance, the Flemish energy balance is approved every year by the Flemish Environment Minister at the end of September). Each annual submission is updated with data from the final regional energy balance available (mainly for the year X-3) as explained in the NIR in section 3.1.3". The ERT considers that this timing reduces the accuracy and quality of the emission estimates in the energy sector, particularly when the recalculations are substantial. For example, the revised or recalculated emissions from the energy sector for 2011 show a difference of 1,054.15 Gg CO_2 eq (a 4.8 per cent increase) between the 2013 and 2014 annual submissions. The ERT encourages Belgium to endeavour to improve the timeliness of the final energy balance and seek ways to ensure that the final annual submission reflects the final energy data, to the extent possible.

22. As in previous annual submissions, Belgium uses regional energy demand statistics in the sectoral approach. These regional energy data are presented in the 2014 NIR (annex 8) in different formats and with different labels for the rows and columns for each region. The ERT noted that Belgium has not reported the full national energy balance despite the recommendations made in previous review reports.[7] In response to a question raised by the ERT during the review regarding the national energy balance, Belgium provided the ERT with spreadsheets showing the full national energy balance for 2012. The ERT notes that the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (hereinafter referred to as the IPCC good practice guidance) requires inventory teams to use national-level energy statistics in the internal QA/QC processes. The ERT therefore reiterates the recommendation made in the previous review report that the Party further enhance the transparency of the NIR by including the full national energy balance for the latest reported year, outlining the final energy consumption by category.

23. In its NIR, Belgium has reported that a working group has been established to improve the harmonization of the regional and federal energy balances for the future; however, there is no description regarding the improvement performed by the working group since 2011 in the NIR. The ERT strongly recommends that Belgium improve the consistency between the regional and national energy balances and reiterates the recommendations made in previous review reports that the Party clearly document in the NIR any remaining differences and provide explanations for these differences in its annual submission.

2. Reference and sectoral approaches

24. Table 5 provides a review of the information reported under the reference approach and the sectoral approach, as well as comparisons with other sources of international data. Issues identified in table 5 are more fully elaborated in paragraphs 25–28 below.

Table 5
Review of reference and sectoral approaches

Issue	*Expert review team assessment*	*Paragraph cross-references*
Difference between the reference approach and the sectoral approach	Energy consumption: –77.43 PJ, –5.61%	

[7] FCCC/ARR/2010/BEL, paragraph 35; FCCC/ARR/2011/BEL, paragraph 40; FCCC/ARR/2012/BEL, paragraph 44; FCCC/ARR/2013/BEL, paragraph 22.

Issue	*Expert review team assessment*	*Paragraph cross-references*
	CO_2 emissions: −5,196.06 Gg CO_2, −5.60%	
Are differences between the reference approach and the sectoral approach adequately explained in the NIR and the CRF tables?	Partly	See paragraph 25 below
Are differences with international statistics adequately explained?	Yes	See paragraph 26 below
Is reporting of bunker fuels in accordance with the UNFCCC reporting guidelines?	Yes	See paragraph 27 below
Is reporting of feedstocks and non-energy use of fuels in accordance with the UNFCCC reporting guidelines?	Yes	See paragraph 28 below

Abbreviations: CRF = common reporting format, NIR = national inventory report, UNFCCC reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories".

Comparison of the reference approach with the sectoral approach and international statistics

25. The difference between the reference approach and the sectoral approach is −5.60 per cent for CO_2 emissions for 2012. The reasons for the difference are described in section 3.2.1 of the NIR and in each documentation box of CRF table 1.A(c) for the complete time series. The difference exceeds 2 per cent for the years 1990, 1991, 1993–1996, 1998, 2001–2008 and 2011. The reasons for the difference, as described in the NIR and in CRF table 1.A(c) are: (1) the reference approach is based on the national energy statistics (top-down), while the sectoral approach is based on regional energy balances (bottom-up); (2) the recovered fuels from naphtha cracking are reported only in the sectoral approach as "other fuels" in the chemical industry; and (3) the differences in CO_2 emissions from gaseous fuels mainly result from the accounting of CO_2 originating from carbon not stored in the reference approach, which is allocated to other sectors in the sectoral approach. However, the explanations for these differences are not specific for each year of the time series and are almost the same as the explanations provided in the 2013 annual submission. The ERT recommends that Belgium provide an explanation for each year of the time series, if the difference between the reference approach and the sectoral approach exceeds 2 per cent. In addition, the ERT believes that one effective solution to decrease the difference between the reference approach and sectoral approach is to improve the consistency between the regional and federal energy balances and also with the energy statistics reported as part of Belgium's international reporting obligations (i.e. to the statistical office of the European Union (Eurostat) and the International Energy Agency (IEA)).

26. In the 2013 annual review report, the ERT recommended that the Party review, and if necessary, revise its reporting in the CRF tables and to IEA to improve the consistency between the reference approach, IEA data and Eurostat data, and also recommended that the Party transparently describe and justify any remaining differences in the NIR. In response to the recommendation made in the previous review report, the Party has revised the complete time series of the reference approach according to the latest statistics available that were provided to Eurostat and IEA for the 2014 annual submission; the revision is briefly explained in the 2014 NIR. However, as a result of the revision, all CO_2 emissions

for the time series estimated using the reference approach have decreased, and most of the differences in the time series between the reference approach and the sectoral approach have increased in comparison with the previous NIR. The ERT reiterates the recommendation made in paragraph 23 above that Belgium improve the consistency between the regional and federal energy balances, and also recommends that the Party improve the consistency between the energy balances and the energy statistics reported internationally to Eurostat and IEA.

International bunker fuels

27. No problems were identified.

Feedstocks and non-energy use of fuels

28. No problems were identified.

3. Key categories

Stationary combustion: solid fuels – CO_2

29. As noted in the 2013 annual review report, and noted again by this ERT, Belgium has reported a relatively low CO_2 IEF for solid fuels for iron and steel (63.91 t CO_2/TJ for 2011 and 54.30 t CO_2/TJ for 2012) compared with the solid fuel IEFs for other categories and with the IPCC default range (94.60–106.70 t CO_2/TJ). The ERT noted the possibility of the misallocation of energy consumption data between the iron and steel category and the public electricity and heat production category, which has an extraordinarily high IEF of 146.56 t CO_2/TJ for 2011 and 151.37 t CO_2/TJ for 2012. In response to a question raised by the ERT during the review, the Party explained that some inconsistency may exist between the reported energy consumption and CO_2 emissions because two different approaches were used for the estimation; namely, the energy balance data were used for the estimation of energy consumption, and the European Union Emissions Trading System (EU ETS) monitoring plan, which is considered to be a more accurate method by the Party, was used for the estimation of CO_2 emissions. The ERT reiterates the strong recommendation made in the previous review report that Belgium review, and if necessary revise, the low IEFs for solid fuels in iron and steel and in order to improve transparency, revise the description in the NIR of the category-specific QA/QC activities performed by explaining the links between the plant-specific AD from the EU ETS, the regional energy balances and the AD reported in the CRF tables in its annual submission.

4. Non-key categories

Civil aviation: liquid fuels – CO_2, CH_4 and N_2O

30. The 2013 annual review report[8] made a strong recommendation that the Party make efforts to use additional AD on all flights in Belgium received from Belgocontrol and to collaborate with Belgocontrol and/or Eurocontrol to improve the emission estimates. In response to a question raised by the ERT during the review regarding the status of the improvement, Belgium explained that "the new study that will be performed to optimize the calculation of emissions for civil aviation in this region will be started by the end of 2014. The results of this study are expected by the end of 2015 and will be integrated into the inventory at that time". The ERT could not conclude whether there was a potential problem during the review week. The ERT strongly reiterates the recommendation made in the previous review report that the Party make efforts to make use of additional data sources and to collaborate with Belgocontrol and/or Eurocontrol to improve the emission estimates.

[8] FCCC/ARR/2013/BEL, paragraph 35.

Solid fuel transformation: solid fuels – CO_2

31. In the 2013 annual review report,[9] the ERT noted that Belgium had reported CO_2 emissions from solid fuel transformation as "NO" (not occurring) in CRF table 1.B.1, even though the Party had reported the AD and CH_4 emissions for this category in the same table. In response to a question raised by the ERT during the 2013 review, Belgium explained that these CO_2 emissions are negligible based on information in a scientific article. The ERT agreed with this explanation and recommended that Belgium include in the NIR the information provided during the review, as well as a brief explanation in the documentation box to the CRF table. In response to the 2013 annual review report, Belgium has reported CO_2 emissions from solid fuel transformation as "NA" (not applicable) in CRF table 1.B.1, instead of "NO"; however, the Party has not explained the reason for the use of the notation key "NA", as the CO_2 emissions are negligible but do exist. The ERT reiterates the recommendation made in the previous review report that Belgium include, in the NIR, the reason why the notation key "NA" has been used and provide a brief explanation in the documentation box to CRF table 1.B.1. The ERT also noted that Belgium has explained in the NIR that "no fugitive emissions take place during coke production in the Flemish region". In response to a question raised by the ERT during the review, Belgium explained how the fugitive emissions are controlled. The ERT agrees with the explanation and recommends that Belgium include the explanation in the NIR.

C. Industrial processes and solvent and other product use

1. Sector overview

32. In 2012, emissions from the industrial processes sector amounted to 11,172.85 Gg CO_2 eq, or 9.6 per cent of total GHG emissions, and emissions from the solvent and other product use sector amounted to 182.88 Gg CO_2 eq, or 0.2 per cent of total GHG emissions. Since 1990, emissions have decreased by 35.8 per cent in the industrial processes sector, and decreased by 10.5 per cent in the solvent and other product use sector. The key drivers for the fall in emissions in the industrial process sector are the use of N_2O abatement catalysts in nitric acid production; the decrease in the production of iron and steel due to the global economic crisis; and the installation of a gas incinerator with a fluoride recovery system in the most important source of HFC emissions (an electrochemical synthesis unit). Within the industrial processes sector, 42.0 per cent of the emissions were from mineral products, followed by 31.7 per cent from the chemical industry, 20.3 per cent from consumption of halocarbons and SF_6 and 4.1 per cent from metal production. The remaining 1.9 per cent were from production of halocarbons and SF_6.

33. Belgium has made recalculations between the 2013 and 2014 annual submissions for the industrial processes sector. The most significant calculations were in the category other (chemical industry). The recalculations were made following changes in AD. Compared with the 2013 annual submission, the recalculations increased emissions in the industrial processes sector by 408.70 Gg CO_2 eq (3.6 per cent), and increased total national emissions by 0.3 per cent. The recalculations were briefly but adequately explained in the NIR.

34. The ERT noted that the use of notation keys for some categories continues to be an issue in relation to the reporting of emissions and AD (e.g. for semiconductor manufacture the AD and IEF are reported as "C" (confidential) for all fluorinated gases (F-gases) in CRF table 2(II).F). However, Belgium has used the notation key "NO" to report emissions of HFC-32 for 2012, even though it has reported the AD and IEF as "C". In response to a question raised by the ERT during the review, Belgium explained that there was an error in

[9] FCCC/ARR/2013/BEL, paragraph 37.

the notation keys used to report the AD for those categories and that the correct notation key for the AD should be "NO" and not "C". The ERT recommends that Belgium correct the notation keys for these categories in its annual submission.

35. The ERT noted that Belgium has made some improvements in the transparency of the NIR regarding explanations of the choice of activity data and methodology for the chemical industry. However, recommendations made in previous review reports in relation to the provision of additional information have generally not been addressed (e.g. information on the methodologies, AD and EFs used to estimate emissions in the semiconductor industry and on the QA/QC procedures). As another example of lack of transparency, Belgium has explained in the NIR that for iron and steel, coke and coal were used as reducing agents in the blast furnace, but the allocation of the gas used as fuel for energy purposes has not been fully explained. The ERT reiterates the recommendations made in previous review reports that Belgium continue to improve the transparency of the NIR.

36. For Belgium, confidentiality remains a concern with regard to the industrial processes sector. The Party still reports aggregated information on the AD and emissions for the key categories (i.e. other (chemical industry), CH_4 emissions from production of carbon black, consumption of halocarbons and F-gases in the semiconductor industry). Belgium explained that more detailed information would become available only when such information is no longer considered confidential by the EU ETS. The ERT reiterates the recommendation made in the previous review report that Belgium provide more detailed data on the methodologies and data sources for the AD and EFs for these and other categories considered by the Party to be confidential.

2. Key categories

Limestone and dolomite use – CO_2

37. Belgium has estimated CO_2 emissions from this category using plant-specific data and the EFs included in the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the Revised 1996 IPCC Guidelines) for the entire time series. The CO_2 IEF has decreased by 88.9 per cent between 1990 (3.75 t/t) and 2012 (0.42 t/t). There are large inter-annual fluctuations in the time series (ranging between –81.9 and 77.1 per cent). In response to a question raised by the ERT during the review, the Party explained that the AD from the Walloon Region are available only for 2006 onwards and that the CO_2 IEF is therefore not consistent with the IEF for the years prior to 2006. Belgium also mentioned that the IEF for the Flemish Region for all years of the time series ranges between 0.40 and 0.42 t/t. The ERT believes that the explanation provided by Belgium justifies the significant variations in the IEF, especially for the missing AD for the Walloon Region for the years prior to 2006. The ERT recommends that Belgium estimate the missing emissions and/or include the explanation provided to the ERT during the review in its NIR.

Iron and steel production – CO_2

38. Belgium mentioned in its 2014 NIR that in the production of iron and steel, coke and coal are used as reducing agents in the blast furnace and a small part of the by-product blast furnace gas is flared while the rest is used as fuel for energy purposes in the integrated plant for electricity generation. The allocation of this gas has not been clearly explained in the NIR. In response to questions raised by the ERT during the review, Belgium explained that in the Walloon Region, all the incoming solid fuels in the blast furnace are included in the fuel consumption of iron and steel in the energy sector, as they are used for boilers in the iron and steel plants for energy purposes. The ERT recommends that Belgium include this information in the NIR.

Production of halocarbons and SF_6 – PFCs

39. There are large inter-annual variations in perfluorobutane (C_4F_{10}) emissions across the entire time series (ranging between –55.5 and 650.4 per cent) and the Party reported the emissions as "NO" for 2001 and 2002. There are also significant inter-annual fluctuations in perfluorohexane (C_6F_{14}) emissions across the entire time series (ranging between –81.3 and 316.9 per cent). In response to questions raised by the ERT during the review, Belgium explained that these fugitive emissions are from a single chemical plant and occur when the waste gas incinerator used for abatement is out of order, which happens frequently, and also as a result of changes in the product mix of the plant. The ERT agrees with the explanation provided by Belgium and recommends that the Party include the information in the NIR.

Consumption of halocarbons and SF_6 – HFCs, PFCs and SF_6[10]

40. Belgium reported the AD and IEFs for semiconductor manufacture as "C" for all F-gases in CRF table 2(II).F and reported the emissions of these gases for the years 2007–2012. The information provided in the NIR indicates that the emission estimates are obtained directly from the relevant companies. However, for HFC-32, Belgium has used the notation key "NO" to report the emissions for 2012, even though it has reported the AD and IEF as "C". In response to questions raised by the ERT during the review, Belgium explained that there was an error in the use of the notation keys and that the correct notation key should be "NO" for the AD for 2012. The ERT recommends that Belgium correct the notation keys for this category in the annual submission.

41. In view of the limited information provided on the category semiconductor manufacture, the ERT reiterates the recommendation made in previous review reports that the Party include information on the methodologies, AD and EFs used to estimate these emissions and on the QA/QC procedures, while preserving confidentiality, as appropriate.

42. Belgium has estimated the emissions from mobile refrigerant consumption by modelling the evolution of the vehicle stock (on the basis of the number of new vehicle registrations) and the percentage of new vehicles equipped with air conditioning. To further clarify the methodology, Belgium provided, during the review, a detailed explanation of the models used to estimate fugitive and disposal emissions. The ERT recommends that Belgium include this information in the NIR.

43. In response to a question raised by the ERT during the review regarding the use of the notation key "NE" (not estimated) instead of "NO" to report SF_6 emissions for the years 1990–2008, Belgium explained that although there is no new manufacturing equipment in the country, there are installation emissions (on the site of high-voltage "closed-up pressure systems") that have been reported under new products and that there were no AD available for the years 1990–2008. However, Belgium has estimated the emissions for the years 2009–2012 for the same category using the amount filled into products and an EF of 1 per cent. The ERT noted that extrapolation could be used to estimate the missing data for 1990–2008. In response thereto, during the review week Belgium submitted revised estimates for SF_6 filled into manufactured electrical products. The Party explained that the "amount of fluid filled into new manufactured products" for the years 1990–2008 was estimated as the difference between the "amount of fluid in operating systems" for the current year and the "amount of fluid in operating systems" for the previous year. The actual emissions were then estimated by applying an EF of 1 per cent, as for the years 2009–2012. The ERT considers that the issue has been resolved. The ERT recommends that Belgium describe all the methodological changes performed in the NIR.

[10] PFC and SF_6 emissions from this category are not key. However, since all issues related to this category are discussed as a whole, the individual gases are not assessed in separate sections.

3. Non-key categories

Soda ash production and use – CO_2

44. According to the NIR, soda ash production took place in the Walloon Region until 1993. Belgium also mentioned that the process used was the Solvay process that produces no emissions of CO_2. However, the CO_2 emitted from coke oxidation is included in the energy sector. In response to a question raised by the ERT during the review, Belgium explained that the CO_2 is included under solid fuels in the energy sector (85 kt CO_2 in 1990 and 36 kt CO_2 in 1993). The ERT recommends that Belgium transparently report the emissions allocated to the energy sector in the NIR.

Other (mineral products) – CO_2

45. The ERT noted large inter-annual fluctuations in the CO_2 IEF for ceramic production (except for the years 1993 and 1994), ranging between –29.6 and 45.7 per cent. Belgium explained that the large fluctuations in the IEF result from the reported information in the Flemish Region, where CO_2 emissions are calculated using the methodology established by the monitoring protocol for companies (European Union directive 2003/87/EC). Emissions can therefore vary strongly depending on the raw material mix that is used (the carbon content in the raw material and the desired ceramic end product). The ERT agrees with the explanation provided by the Party and recommends that Belgium include it in the annual submission.

Glass production – CO_2

46. In its NIR, Belgium has reported that, since 2005, the CO_2 EF for glass production in the Walloon Region has been calculated by the glass plants. However, the CO_2 IEF has decreased by 17.2 per cent between 2005 (0.14 t/t) and 2012 (0.12 t/t). In response to a question raised by the ERT during the review, Belgium explained that the trend can be mainly attributed to the Walloon Region and the changes in the share of glass type produced. The Party also explained that in 2012, the production of flat glass decreased by 18 per cent compared with 2005, with a CO_2 IEF of 133 kg/t, and the amount of glass wool production increased by 106 per cent compared with 2005, with a CO_2 IEF of 54 kg/t. The ERT is satisfied with this explanation and recommends that Belgium provide this explanation in its NIR.

Ammonia production – CH_4

47. In response to questions raised by the ERT during the review, Belgium explained that the CH_4 emissions from ammonia production are based on an analysis undertaken in 1999 of the scrubber at one plant and an average concentration of 114 ppm was multiplied by the flow rate and the annual operating hours. The Party also mentioned that no further analyses have been performed since 1999. The ERT encourages Belgium to take steps to conduct further and regular analyses of the waste ammonia gas concentration and report on such analyses in its NIR.

D. Agriculture

1. Sector overview

48. In 2012, emissions from the agriculture sector amounted to 9,256.53 Gg CO_2 eq, or 7.9 per cent of total GHG emissions without LULUCF. Since 1990, emissions have decreased by 19.1 per cent. The key driver for the fall in emissions is the 38 per cent reduction in the number of agricultural and horticultural businesses since 2000 due to the decrease in animal numbers (mostly dairy cattle and swine) and the amount of nitrogen fertilizer used. These drivers are directly related to the Common Agricultural Policy of the

European Union. Within the sector, 38.5 per cent of the emissions were from enteric fermentation, followed by 38.1 per cent from agricultural soils and 23.4 per cent from manure management. Emissions from rice cultivation, prescribed burning of savannas, field burning of agricultural residues and other (agriculture) were reported as "NO".

49. Belgium has made recalculations between the 2013 and 2014 annual submissions for this sector. The ERT notes that Belgium has recalculated emissions in all reported categories of the agriculture sector. The most significant recalculations were in the category agricultural soils. These recalculations reflect the recommendations made in the previous review report and were based on changes in methodological approaches and the revision of AD. Compared with the 2013 annual submission, the recalculations decreased emissions in the agriculture sector by 58.18 Gg CO_2 eq (0.6 per cent), and decreased total national emissions by 0.05 per cent. The recalculations were not adequately explained. The ERT commends Belgium for providing explanations of the recalculations made in the 2014 annual submission in several chapters of the NIR and in CRF table 8(b); however, the explanations are not completely transparent (e.g. the revision of livestock for 2007 in the Flemish Region). The ERT recommends that Belgium provide transparent explanations of and reasons for all recalculations made in its annual submission.

50. The ERT reiterates the strong recommendations made in previous review reports regarding the consistency of the inventory. Belgium does not use appropriate and consistent methodologies across the three regions in the country. For example, Belgium states in its NIR that because of the "small amount of cattle in the Brussels-Capital region, the Brussels Capital region uses a tier 1 methodology" to estimate emissions from enteric fermentation. The ERT recommends that Belgium provide the analysis of the key categories at the national level and apply the key category guidelines regarding the use of higher-tier methods for the key categories for all regions in Belgium.

2. Key categories

Enteric fermentation – CH_4

51. The ERT notes that Belgium continues to estimate emissions from dairy and non-dairy cattle for enteric fermentation at two different tier levels (tier 2 for the Flemish and Walloon regions and tier 1 for the Brussels-Capital Region) despite the strong reiterated recommendations made in previous review reports regarding the use of a tier 2 method for the Brussels-Capital Region. The ERT recommends that Belgium use a weighted average for the country-specific EFs for dairy and non-dairy cattle calculated for the Walloon and Flemish regions and apply it to the Brussels-Capital Region. Alternatively, if Belgium deems that the recommendation made in the previous review report to use the EFs from either the Flemish or the Walloon region would lead to a more accurate estimate for the Brussels-Capital Region, the ERT recommends that these values be considered. In all cases, the ERT recommends that Belgium document the choice of EFs for the Brussels-Capital Region in the NIR.

52. Belgium uses two sources for livestock AD: the agricultural census of the National Statistical Office (for the Walloon and Brussels-Capital regions) and data from the Flemish Land Agency. As these two sources are not consistent, the Flemish Region performed a QA analysis to compare the differences in emissions calculated from each data source. The comparison showed that the emissions calculated using data from the agricultural census are higher than those calculated using data from the Flemish Land Agency, but this difference does not exceed 10 per cent, which is the uncertainty level of the census. For this reason, the Flemish Region discontinued this comparison exercise in 2007. In response to an earlier draft of this report, Belgium indicated that the Flemish Region is considering using only the data set of the Flemish Land Agency in the future as it is deemed to be more accurate than continuing to use two different data sources. The ERT welcomes efforts by

the Party to improve the accuracy of the inventory and recommends that Belgium implement appropriate QA procedures in the future to maintain the transparency and accuracy of its reporting.

Manure management – CH_4 and N_2O

53. The ERT noted that Belgium continues to estimate emissions from manure management at two different tier levels (tier 2 for the Flemish and Walloon regions and tier 1 for the Brussels-Capital Region). The ERT reiterates the strong recommendation made in previous review reports that Belgium harmonize the methodological approach across the regions for estimating CH_4 and N_2O emissions from manure management. The ERT considers the justification provided by Belgium for the use of the tier 1 approach for the Brussels-Capital Region to be insufficient. The ERT encourages Belgium to streamline the methodological approaches used for the inventory for all regions. Alternatively, if Belgium deems that the recommendation made in previous review reports to use either the EFs from the Flemish or Walloon Regions would lead to a more accurate estimate for the Brussels-Capital Region, the ERT recommends that these values be considered. In all cases, the ERT recommends that Belgium document the choice of EFs for the Brussels-Capital region in the NIR.

54. The ERT welcomes the fact that Belgium uses tier 2 methodology and country-specific EFs and other parameters (e.g. maximum methane-producing capacity, volatile solids excreted) to estimate CH_4 emissions from manure management for cattle and swine. However, the ERT notes the lack of transparency in the information provided to justify the use of the country-specific values and recommends that Belgium include more detailed explanations in the NIR.

55. The ERT noted inconsistencies in the reporting of the allocation of animals to the animal waste management systems (AWMS) for swine and poultry in the NIR for the Flemish Region (table 6.17a) and in CRF table 4.B(b). In response to a question raised by the ERT during the review, Belgium explained that NIR table 6.17a is incorrect and that the statement "96 per cent liquid storage" should read "96 per cent other AWMS" for the Flemish Region. This figure equates to 85.0 per cent at the national level (no "other AWMS" occur in the Walloon Region). Other AWMS are: for swine, pit storage below animal confinements; and for poultry, poultry manure without bedding. The ERT recommends that Belgium correct this information and include a description of the AWMS used in the different regions in the NIR.

56. The ERT notes that the strong recommendation made in the previous review report for the Brussels-Capital Region to estimate N_2O emissions from manure management using appropriate and consistent methods in accordance with the IPCC good practice guidance was not implemented. Therefore the ERT strongly reiterates this recommendation. Alternatively, if Belgium deems that the recommendation made in previous review reports to use either the EFs from the Flemish or Walloon Regions would lead to a more accurate estimate for the Brussels-Capital Region, the ERT recommends that these values be considered. In all cases, the ERT recommends that Belgium document the choice of EFs for the Brussels-Capital Region in the NIR.

Agricultural soils – N_2O

57. The ERT notes that the Belgian region-specific fraction of synthetic nitrogen fertilizer applied to soils ($Frac_{GASF}$) (0.04) is lower than the IPCC default value (0.1), and the fraction of livestock nitrogen excreted and deposited onto soils ($Frac_{GASM}$) (0.21) is higher than the IPCC default value (0.2). Belgium explained during the review that different methodological approaches and country-specific values were used in the different regions. The ERT considers the explanation reasonable and recommends that Belgium

increase the transparency of its reporting by including a detailed justification for the use of the region-specific fractions in the NIR.

58. The ERT notes that the Belgian country-specific parameter for nitrogen leaching ($Frac_{LEACH}$) (0.13) is lower than the IPCC default value (0.3), without a detailed explanation in the NIR as to why this is so. In response to a question raised by the ERT during the review, Belgium explained that this fraction is region-specific. The amount of nitrogen leached in the Flemish Region is calculated by the SENTWA model (system for the evaluation of nutrient transport to water). This model calculates the discharge of nutrient streams caused by agriculture to the surface water, and is based on a split of the nutrient stream in seven substreams or sources of loss and takes into account annual climatic conditions. The $Frac_{LEACH}$ for the Walloon Region comes from a study conducted by SITEREM (2001)[11] and the Brussels-Capital Region uses the IPCC default value. The ERT therefore recommends that Belgium increase the transparency of the calculation of emissions from and reporting of this category and include additional information on the calculation method in the NIR. The ERT also encourages Belgium to streamline the methodological approaches used across the three regions to enhance consistency.

E. Land use, land-use change and forestry

1. Sector overview

59. In 2012, net removals from the LULUCF sector amounted to 1,381.26 Gg CO_2 eq. Since 1990, net removals have increased by 65.5 per cent. The key drivers for the rise in removals are the ongoing increase in carbon stock in forest land and the increasing carbon stock in grassland, especially land converted to grassland. Within the sector, 3,844.12 Gg CO_2 eq of net removals were from forest land, followed by 188.02 Gg CO_2 eq from grassland and 23.00 Gg CO_2 eq from wetlands. Net emissions were reported from cropland (1,988.28 Gg CO_2 eq) and settlements (578.80 Gg CO_2 eq). The remaining 106.81 Gg CO_2 eq of net emissions were from other land. Emissions from other (LULUCF) were reported as "NO".

60. Belgium has made recalculations between the 2013 and 2014 annual submissions for this sector. The two most significant recalculations made by Belgium between the 2013 and 2014 annual submissions were in the following categories: cropland remaining cropland and grassland remaining grassland. The recalculations were made in response to the 2013 annual review report and were made because of the inclusion of an estimate of the carbon stock changes in living biomass on cropland remaining cropland (orchards) and the inclusion of emission estimates associated with organic soils on both cropland remaining cropland and grassland remaining grassland. Compared with the 2013 annual submission, the recalculations increased emissions in the LULUCF sector by 100.76 Gg CO_2 eq (7.9 per cent).

61. To estimate the carbon stock changes in forest land remaining forest land, Belgium applies different AD collection techniques and estimation methods between the three regions. In the Walloon Region, three inventory cycles have been completed (for 1981, 2001 and 2010) while in the Flemish and Brussels-Capital regions, only a single inventory cycle has been completed (for 2001 and 2008, respectively). As a result of the varying availability of data, Belgium has applied different methods for the estimation of the carbon stock changes in living biomass. In the Walloon Region, the carbon stock change method is

[11] SITEREM. 2001. *Estimation des émissions dans l'air de CH_4, NH_3 et N_2O par le secteur agricole en région wallonne.* Rapport final demandé par le Ministère de la Région Wallonne, Direction Générale des Ressources Naturelles et de l'Environnement.

applied, while in the Flemish and Brussels-Capital regions, the default (gain–loss) method is applied. In response to an earlier draft of this report, Belgium noted that as soon as the forest inventories of the other regions become available, the carbon stock change method will be applied in the other regions. The ERT welcomes this information and recommends that the Party implement the higher-tier method as soon as possible to improve accuracy

2. Key categories

Forest land remaining forest land – CO_2

62. Belgium applies the stock change method to estimate the carbon stock changes in forest land remaining forest land. These estimates are based on AD derived from forest inventories conducted in each of the three regions of Belgium. In the Walloon Region, which contains 78 per cent of Belgium's forest land remaining forest land, the results from three cycles of the national forest inventory programme are available. The central years for the three cycles are 1981, 2001 and 2010. In the Flemish Region, which contains 21 per cent of Belgium's forest land remaining forest land, the results from only two inventory cycles are available; therefore, the IPCC default method is used to estimate the carbon stock changes. The ERT notes this methodological inconsistency and encourages Belgium to update the method used to estimate the carbon stock changes in the Flemish Region, as indicated in the planned inventory improvements section of the NIR.

Land converted to forest land – CO_2

63. Belgium describes the method used to estimate the carbon stock changes in living biomass in land converted to forest land in section 7.2.2.2 of the NIR. In this section, Belgium refers to equations 3.2.25, 3.2.23 and 3.2.24 of the IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry* (hereinafter referred to as the IPCC good practice guidance for LULUCF) as the basis for the method used to estimate the carbon stock changes. However, Belgium does not further elaborate on the parameter values applied to these equations in order to estimate the carbon stock changes in living biomass. The ERT recommends that Belgium provide, in its annual submission, a reference to the parameter values applied to the IPCC default equations in order to estimate the carbon stock changes in living biomass.

64. In the NIR, Belgium describes the method used to estimate the changes in soil carbon stocks in forest land. In the explanation, the Party refers to the relevant equations in the IPCC good practice guidance for LULUCF; however, the parameter values (soil organic carbon $(SOC)_{NonForestLand}$ and SOC_{Forest}) included in this equation are not clearly explained in the NIR. Following a question raised by the ERT during the review, Belgium clarified that the relevant parameter values are included in table 7.8 of the NIR. To improve the transparency of its reporting, the ERT recommends that Belgium include, in the annual submission, clear references to the parameter values applied to estimate the carbon stock changes in the soil pool.

Cropland remaining cropland – CO_2

65. Belgium has implemented a new method to estimate the carbon stock changes associated with perennial woody horticulture in cropland remaining cropland in its 2014 annual submission. The ERT commends Belgium for implementing this new method. However, in response to questions raised by the ERT during the review, Belgium explained that the land use upon which the expansion of orchards has occurred is unknown and it is assumed that this expansion has occurred within the category cropland remaining cropland. To improve transparency, the ERT recommends that Belgium document, in the annual submission, the assumptions regarding the land use.

Land converted to cropland – CO_2

66. Emissions from land converted to cropland continuously increase during the period 1990–2012. This increasing trend of emissions is a result of the area of land converted to cropland increasing over time. The drivers of this trend, for example increasing agricultural production, are not adequately explained in the NIR. The ERT recommends that Belgium separately describe the processes causing the increasing area of cropland in its annual submission.

67. Along with the increasing trend of emissions from land converted to cropland, there is also a decreasing trend in the IEF for the carbon stock changes in living biomass for this category. In response to a question raised by the ERT during the review, Belgium explained that, within the category land converted to cropland, only forest land converted to cropland provides a source of emissions from living biomass. The decline in the IEF for the carbon stock changes in living biomass for this category occurs as a result of the diminishing share of forest land converted to cropland within the category. In response to an earlier draft of this report, Belgium noted that this trend in the IEF occurs because some areas deforested 20 years ago are still included (in accordance with paragraph 6(d) of the annex to decision 15/CMP.1) while no more net emissions from deforestation occur in living biomass or in soil. Although this is correct for the deforestation classification in the KP-LULUCF inventory, in the Convention inventory land is re-classified to the land remaining classification after the requisite period of time has elapsed (see IPCC good practice guidance for LULUCF, section 2.3.1, page 2.7). The ERT recommends that Belgium include, in its annual submission, sufficient material to explain the trend in emissions and IEFs.

Settlements – CO_2

68. Emissions from settlements display an unusual trend of linearly increasing emissions from 1990 to 2006, followed by a downward trend in emissions, even though the area of land included within this category continuously increases over the whole inventory period (1990–2012). This pattern results in a sharp fall (fewer emissions) in the IEF for the carbon stock changes in living biomass from 2006 onwards. In response to questions raised by the ERT during the review regarding these trends, Belgium explained that, similarly to land converted to cropland, only forest land converted to settlements provides a source of emissions from living biomass. The decline in the IEF for the carbon stock changes in living biomass for settlements occurs as a result of the diminishing share of forest land converted to settlements within the category. In response to an earlier draft of this report, Belgium noted that this trend in the IEF occurs because some areas deforested 20 years ago are still included (in accordance with paragraph 6(d) of the annex to decision 15/CMP.1) while no more net emissions from deforestation occur in living biomass or in soil. Although this is correct for the deforestation classification in the KP-LULUCF inventory, in the Convention inventory land is re-classified to the land remaining classification after the requisite period of time has elapsed (see IPCC good practice guidance for LULUCF, section 2.3.1, page 2.7). The ERT recommends that Belgium include, in its annual submission, sufficient material to explain the trend in emissions and IEFs.

3. Non-key categories

Other land – CO_2

69. The area of land classified as other land in Belgium has increased by 14,800 ha since 1990. Belgium has explained in its NIR that other land includes bare soil, rock, ice and all unmanaged land. In response to questions raised by the ERT during the review, the Party further clarified that the definition of "other land" is used to classify land with a land use that could not be determined. With the further elaboration of the definition of "other land"

in the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* (hereinafter referred to as the 2006 IPCC Guidelines), the ERT encourages Belgium to review its land classification system with the aim of developing a system that can be used to classify the land use of all land in the country and not to use the other land classification for the purpose of statistical discrepancy.

F. Waste

1. Sector overview

70. In 2012, emissions from the waste sector amounted to 1,508.30 Gg CO_2 eq, or 1.3 per cent of total GHG emissions. Since 1990, emissions have decreased by 53.5 per cent. The key drivers for the fall in emissions are: the 2007 Wallonia Act and the Flemish legislation applied since 2006, which prohibit the disposal of gross household and municipal waste on landfills; the recovery of CH_4 for energy and the use of biogas from wastewater treatment plants; and an increase in the amount of incinerated waste in the Walloon and Flemish regions. Within the sector, 38.4 per cent of the emissions were from solid waste disposal on land, followed by 34.3 per cent from waste incineration. Wastewater handling accounted for 25.7 per cent. The remaining 1.6 per cent were from other (waste).

71. Belgium has made recalculations between the 2013 and 2014 annual submissions for this sector. The two most significant recalculations made by Belgium between the 2013 and 2014 annual submissions were in the following categories: solid waste disposal on land and waste incineration. The recalculations were made in response to the 2013 annual review report and following changes in AD. Compared with the 2013 annual submission, the recalculations decreased emissions in the waste sector by 73.51 Gg CO_2 eq (4.6 per cent) and decreased total national emissions by 0.1 per cent. The recalculations were adequately explained.

72. The ERT noted that the QA/QC plan for the waste sector is not well described in the NIR and is outdated. In response to a question raised by the ERT during the review, the Party provided the ERT with a detailed description of the category-specific QA/QC procedures for CH_4 emissions from managed waste disposal on land and CO_2 emissions from waste incineration. The ERT reiterates the recommendations made in previous review reports that Belgium update the QA/QC plan and provide more information in the NIR.

2. Key categories

Solid waste disposal on land – CH_4

73. Belgium has reported the emissions from solid waste disposal sites (SWDS) in the Flemish and Walloon Regions using three different methodologies (two different methods in the Flemish Region and one in the Walloon Region) and fractions of waste accordingly. The ERT considers that the waste fractions have not been divided in accordance with the Revised 1996 IPCC Guidelines. The ERT encourages Belgium to make efforts to divide the fractions in accordance with the Revised 1996 IPCC Guidelines and to use a harmonized methodology for the country. In response to a question raised by the ERT during the review, Belgium explained that in the preparation of the 2015 annual submission, the inventory teams in the three regions are currently investigating the implementation of the 2006 IPCC Guidelines. As part of this exercise, possibilities of harmonizing the approach between the regions are being examined.

74. Belgium has reported in the NIR that the total period taken into consideration in the first-order decay (FOD) model is 25 years for old SWDS in the Flemish Region. For new SWDS in the Flemish Region, the half-life is between 4 and 30 years, depending on the

Table 11
Information to be included in the compilation and accounting database in t CO_2 eq for 2011

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2011				
CO_2	104 270 664			104 270 664
CH_4	6 465 843			6 465 843
N_2O	7 037 189			7 037 189
HFCs	2 076 452			2 076 452
PFCs	179 028			179 028
SF_6	116 338			116 338
Total Annex A sources[c]	**120 145 514**			**120 145 514**
Activities under Article 3, paragraph 3, for 2011				
3.3 Afforestation and reforestation on non-harvested land for 2011	–295 858			–295 858
3.3 Afforestation and reforestation on harvested land for 2011	NO			NO
3.3 Deforestation for 2011	499 186			499 186
Activities under Article 3, paragraph 4, for 2011[d]				
3.4 Forest management for 2011				
3.4 Cropland management for 2011				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2011				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2011				
3.4 Revegetation for the base year				

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, NO = not occurring.

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

degradability. The ERT considers that the waste fractions have not been divided in accordance with the IPCC good practice guidance. In response to a question raised by the ERT during the review, Belgium explained that it probably did confuse the time-lag period with the total period taken into account when there is a bacterial breakdown of the waste and that emissions do occur in the reporting of CRF table 6.A,C. The time-lag period considered in the Walloon Region is 1 year. The total period taken into account when there is a bacterial breakdown of the waste considered in the Walloon Region is 42 years (three times the default half-life of 14 years). The ERT recommends that Belgium correct the time-lag values in the relevant CRF table in its annual submission. In addition, the ERT recommends that the Party include, in the NIR, correct and relevant information and detailed explanations on the parameter values used in the calculations using the IPCC 2006 model.

75. During the review, the ERT requested Belgium to provide additional information on CH_4 recovery practices in the different regions. In response to a question raised by the ERT during the review, Belgium explained that in the Walloon and Flemish regions, CH_4 recovery is based on direct measurements from the SWDS owners and therefore could be considered accurate. In response to an earlier draft of this report, Belgium indicated that it would prepare a table showing an overview of total CH_4 generated, CH_4 recovery and CH_4 emissions per region and for Belgium as a whole. The ERT welcomes this intention and encourages the Party to provide this information in its NIR.

76. Belgium has used biodegradable fractions and the methane generation rate constant (k) from the Netherlands in the FOD model for older SWDS. In response to a question raised by the ERT during the review, Belgium explained that in developing the multi-phase model, Flemish waste experts were consulted and the values obtained from a study in the Netherlands were considered appropriate for application to the Flemish Region owing to the similar conditions. From the 2015 annual submission onwards, Belgium will use the new IPCC waste model from the 2006 IPCC Guidelines, including the default values for this model. The ERT welcomes this approach.

Wastewater handling – CH_4 and N_2O

77. Belgium has reported that sludge from domestic and commercial wastewater treatment plants that use anaerobic digestion is used for energy production. In response to a question raised by the ERT during the review, Belgium explained that the largest part of the sludge from wastewater treatment plants in the Flemish Region is incinerated, and is taken into account in the Flemish energy balance and, consequently, is reported in the energy sector. Other use of sludge in the Flemish Region includes use as secondary raw material in the agriculture sector (mainly sludge from the food industry). The direct use of sludge in the agriculture sector as fertilizer is limited, in accordance with European Union directive 86/278/EEC on sewage sludge. As more accurate data become available, further updates on this issue in the inventory (and in the NIR) are anticipated in the annual submission.

78. The ERT encourages the Party to provide a table with data on the population, protein consumption, nitrogen fraction in protein and EF for N_2O emissions from human sewage for the entire time series (1990 onwards), not only for 2012 (as in table 8.8 of the NIR).

Table 12
Information to be included in the compilation and accounting database in t CO_2 eq for 2010

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2010				
CO_2	113 429 206			113 429 206
CH_4	6 661 317			6 661 317
N_2O	8 328 808			8 328 808
HFCs	1 999 479			1 999 479
PFCs	85 563			85 563
SF_6	106 564			106 564
Total Annex A sources[c]	**130 610 937**			**130 610 937**
Activities under Article 3, paragraph 3, for 2010				
3.3 Afforestation and reforestation on non-harvested land for 2010	–284 308			–284 308
3.3 Afforestation and reforestation on harvested land for 2010	NO			NO
3.3 Deforestation for 2010	499 428			499 428
Activities under Article 3, paragraph 4, for 2010[d]				
3.4 Forest management for 2010				
3.4 Cropland management for 2010				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2010				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2010				
3.4 Revegetation for the base year				

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, NO = not occurring.
[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).
[b] "Final" includes revised estimates, if any, and/or adjustments, if any.
[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.
[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

G. Supplementary information required under Article 7, paragraph 1, of the Kyoto Protocol

1. Information on activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

Overview

79. Table 6 provides an overview of the information reported and parameters selected by Belgium under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

Table 6
Supplementary information reported under Article 3, paragraphs 3 and 4, of the Kyoto Protocol

Issue	*Expert review team assessment, if applicable*	*Findings and recommendations*
Assessment of Party's reporting in accordance with the requirements in paragraphs 5–9 of the annex to decision 15/CMP.1	Sufficient	
Activities elected under Article 3, paragraph 4	None	
Period of accounting		Commitment period accounting
Party's ability to identify areas of land and areas of land-use change in accordance with paragraph 20 of the annex to decision 16/CMP.1	Sufficient	

80. Chapter G.1 includes the ERT's assessment of the 2014 annual submission against the Article 8 review guidelines and decisions 15/CMP.1 and 16/CMP.1. In accordance with decision 6/CMP.9, Parties will begin reporting of KP-LULUCF activities in the submissions due by 15 April 2015 using revised CRF tables, as contained in the annex to decision 6/CMP.9. Owing to this change in the CRF tables for KP-LULUCF activities, and the change from the first commitment period to the second commitment period, paragraphs 80–82 below contain the ERT's assessment of the Party's adherence to the current reporting guidelines and do not provide specific recommendations for reporting of these activities in the 2015 annual submission.

Activities under Article 3, paragraph 3, of the Kyoto Protocol

81. In chapter 10.3.1 of the NIR Belgium describes methods to estimate carbon stock change in each pool for land included in the KP-LULUCF activities. The information provided is in a summary form and also includes references to chapter 7 of the NIR (Convention LULUCF). However, while the information is provided in chapter 7, it is necessary to read both methods for land remaining and conversion categories in order to gather all of the necessary information. The ERT strongly recommends that Belgium provide all information regarding methods relevant to the estimation of emissions for KP-LULUCF transparently in chapter 10.3.1 of the NIR even if doing so introduces some repetition of the information provided in chapter 7. This is to ensure that, consistent with

the strong recommendation in the previous review report, Belgium improve the transparency of the information provided in its NIR. provide further information to satisfy the mandatory reporting element of paragraph 6(a) of the annex to decision 15/CMP.1 and clearly specify, in the NIR, the methods used to report the emissions from each carbon pool under afforestation and reforestation, and deforestation.

Afforestation and reforestation – CO_2

82. Belgium reported a total of 26,570 ha of afforestation and reforestation for 2012. In 2012, afforestation and reforestation provided net removals of 307.45 Gg CO_2 eq and represented less than 0.5 per cent of the total national emissions reported in the national inventory of Belgium. There were no recalculations of afforestation or reforestation in the 2014 annual submission.

83. Within afforestation and reforestation, Belgium includes 1,460 ha of other land converted to forest land. Other land is generally considered as an unmanaged type of land use and, therefore, this creates uncertainty as to whether the forests growing on other land are directly human-induced. The ERT is of the view that these conversion events were directly human-induced based on the fact that: (1) in the NIR, Belgium states that there are no natural forests in the country and provides a description of supporting evidence; and (2) as identified in the review of the inventory for the reporting under the Convention, Belgium uses the "other land" classification for the purpose of reporting statistical discrepancies in the land-use classification system. The ERT reiterates the recommendation that Belgium review its land classification system with the aim of developing a system that can be used to classify the use of all land in Belgium and that the Party not use the other land classification for the purpose of statistical discrepancy. With such a system in place, the ERT recommends that Belgium consider whether the conversion of other land to forest land is a directly human-induced conversion of land use.

Deforestation – CO_2

84. Belgium reported a total of 24,580 ha of deforestation land for 2012. In 2012, deforestation was a net source of emissions (498.95 Gg CO_2 eq) and represented less than half of 1 per cent of the total national emissions reported in the national inventory of Belgium. Minor recalculations of deforestation (average of 0.34 Gg CO_2/year) were included in the 2014 annual submission. The documentation included in the CRF table 5(KP-I)A.2 indicates that to improve consistency with the reporting requirements, land permanently remains within the classification of deforestation. The ERT recommends that Belgium include, in the section of the NIR on the reporting under the Kyoto Protocol, a clear explanation for the recalculations of emission estimates.

85. The ERT commends Belgium for implementing the recommendation of the previous ERT to report emissions from liming on deforestation lands.

2. Information on Kyoto Protocol units

Standard electronic format and reports from the national registry

86. Belgium has reported information on its accounting of Kyoto Protocol units in the required SEF tables, as required by decisions 15/CMP.1 and 14/CMP.1. The ERT took note of the findings included in the standard independent assessment report (SIAR) on the SEF

tables and the SEF comparison report.[12] The SIAR was forwarded to the ERT prior to the review, pursuant to decision 16/CP.10.

87. Information on the accounting of Kyoto Protocol units has been prepared and reported in accordance with decision 15/CMP.1, annex, chapter I.E, and reported in accordance with decision 14/CMP.1 using the SEF tables. This information is consistent with that contained in the national registry and with the records of the international transaction log (ITL) and the clean development mechanism registry and meets the requirements referred to in decision 22/CMP.1, annex, paragraph 88(a–j). The transactions of Kyoto Protocol units initiated by the national registry are in accordance with the requirements of the annex to decision 5/CMP.1 and the annex to decision 13/CMP.1. No discrepancy has been identified by the ITL and no non-replacement has occurred. The national registry has adequate procedures in place to minimize discrepancies.

Accounting of activities under Article 3, paragraph 3, of the Kyoto Protocol

88. Belgium has reported information on its accounting of KP-LULUCF in the accounting table, as included in the annex to decision 6/CMP.3. Information on the accounting of KP-LULUCF has been prepared and reported in accordance with decisions 16/CMP.1 and 6/CMP.3.

89. Table 7 shows the accounting quantities for KP-LULUCF as reported by the Party and the final values after the review.

Table 7
Accounting quantities for activities under Article 3, paragraph 3, and, if any, activities under Article 3, paragraph 4, of the Kyoto Protocol, in t CO_2 eq

	2014 annual submission[a]		
	As reported	*Revised estimates*	*Final accounting quantity*[b]
Afforestation and reforestation			
Non-harvested land	–1 421 728		–1 421 728
Harvested land	NO		NO
Deforestation	2 502 544		2 502 544
Forest management	NA		NA
Article 3.3 offset[c]	NA		NA
Forest management cap[d]	NA		NA
Cropland management	NA		NA
Grazing land management	NA		NA
Revegetation	NA		NA

Abbreviations: CRF = common reporting format, KP-LULUCF = land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, NA = not applicable, NO = not occurring.

[a] The values included under the 2014 annual submission are the cumulative accounting values for 2008, 2009, 2010, 2011 and 2012, as reported in the accounting table of the KP-LULUCF CRF tables for the inventory year 2012.

[12] The SEF comparison report is prepared by the international transaction log (ITL) administrator and provides information on the outcome of the comparison of data contained in the Party's SEF tables with corresponding records contained in the ITL.

[b] The "final accounting quantity" is the quantity of Kyoto Protocol units that the Party shall issue or cancel under each activity under Article 3, paragraph 3, and paragraph 4, if relevant, based on the final accounting quantity in the 2014 annual submission.

[c] "Article 3.3 offset": for the first commitment period, a Party included in Annex I to the Convention that incurs a net source of emissions under the provisions of Article 3, paragraph 3, of the Kyoto Protocol may account for anthropogenic greenhouse gas emissions by sources and removals by sinks in areas under forest management under Article 3, paragraph 4, up to a level that is equal to the net source of emissions under the provisions of Article 3, paragraph 3, but not greater than 9.0 megatonnes of carbon times five, if the total anthropogenic greenhouse gas emissions by sources and removals by sinks in the managed forest since 1990 is equal to, or larger than, the net source of emissions incurred under Article 3, paragraph 3.

[d] In accordance with decision 16/CMP.1, annex, paragraph 11, for the first commitment period only, additions to and subtractions from the assigned amount of a Party resulting from forest management under Article 3, paragraph 4, of the Kyoto Protocol after the application of decision 16/CMP.1, annex, paragraph 10, and resulting from forest management project activities undertaken under Article 6, shall not exceed the value inscribed in the appendix of the annex to decision 16/CMP.1, times five.

90. Based on the information provided in table 7 for the activity afforestation and reforestation, Belgium shall: for non-harvested land, issue 1,421,728 removal units (RMUs) in its national registry; and for harvested land, issue no RMUs in its national registry.

91. Based on the information provided in table 7 for the activity deforestation, Belgium shall cancel 2,502,544 assigned amount units, emission reduction units, certified emission reduction units and/or RMUs in its national registry.

Calculation of the commitment period reserve

92. Belgium has reported its commitment period reserve in its 2014 annual submission. Belgium reported that its commitment period reserve has not changed since the initial report review (606,595,975 t CO_2 eq) as it is based on the assigned amount and not the most recently reviewed inventory. The ERT disagrees with this figure. The ERT's calculation of the commitment period reserve is 582,601,577 t CO_2 eq. based on 100 per cent times the most recent inventory, which is lower than 90 per cent of the assigned amount.

3. Changes to the national system

93. Belgium reported that there are no changes in its national system since the previous annual submission. The ERT concluded that the Party's national system continues to be in accordance with the requirements of national systems outlined in decision 19/CMP.1.

4. Changes to the national registry

94. Belgium reported that there are changes in its national registry since the previous annual submission. The changes were already in effect but not adequately described in the 2013 NIR. The additional information, provided during the 2012 review, is now reported as a change in the national registry in the 2014 annual submission. The ERT concluded that, taking into account the confirmed changes in the national registry, Belgium's national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant decisions of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP).

5. Minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol

95. Consistent with paragraph 23 of the annex to decision 15/CMP.1, Belgium provided information relating to how it is striving, under Article 3, paragraph 14, of the Kyoto Protocol, to implement its commitments in such a way as to minimize adverse social,

environmental and economic impacts on developing country Parties, particularly those identified in Article 4, paragraphs 8 and 9, of the Convention.

96. In the reported information, Belgium highlights the fact that it has suppressed subsidies supporting the use of coal and other fossil fuels for energy production and enhanced the promotion of biofuels in accordance with the common policies of the European Union, in particular regarding sustainability criteria. Belgium also reports on how it takes advantage of flexibility mechanisms, particularly in its participation in clean development mechanism (CDM) projects, presenting a list of CDM projects with which the federal and/or regional governments of Belgium have signed an emission reduction purchase agreement.

97. Belgium reported that there are no changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol since the previous annual submission. The ERT concluded that the information provided continues to be complete and transparent. The description of the activities under Article 3, paragraph 14, of the Kyoto Protocol, as contained in the report of the individual review of the annual submission of Belgium submitted in 2013,[13] therefore remains relevant.

III. Conclusions and recommendations

A. Conclusions

98. Table 8 summarizes the ERT's conclusions on the 2014 annual submission of Belgium, in accordance with the Article 8 review guidelines.

Table 8
Expert review team's conclusions on the 2014 annual submission of Belgium

Issue	*Expert review team assessment*	*Paragraph cross-references for identified problems*
The ERT concludes that the inventory submission of Belgium is complete with regard to categories, gases, years and geographical boundaries and contains both an NIR and CRF tables for 1990–2012		
Annex A sources[a]	Complete	
LULUCF[a]	Complete	
KP-LULUCF	Complete	
The ERT concludes that the inventory submission of Belgium has been prepared and reported in accordance with the UNFCCC reporting guidelines	Yes	
The Party's inventory is in accordance with the Revised 1996 IPCC Guidelines, the IPCC good practice guidance and the IPCC good practice guidance for LULUCF	Generally	See paras. 22, 56, 73 and 74 above
The submission of information required under Article 7, paragraph 1, of the Kyoto Protocol has been prepared and	Yes	

[13] FCCC/ARR/2013/BEL, paragraphs 101–102.

Issue	*Expert review team assessment*	*Paragraph cross-references for identified problems*
reported in accordance with decision 15/CMP.1		
Party has reported information on its accounting of Kyoto Protocol units in accordance with decision 15/CMP.1, annex, chapter I.E, and used the required reporting format tables as specified by decision 14/CMP.1	Yes	
The national system continues to perform its required functions as set out in the annex to decision 19/CMP.1	Yes	
The national registry continues to perform the functions set out in the annex to decision 13/CMP.1 and the annex to decision 5/CMP.1 and continues to adhere to the technical standards for data exchange between registry systems in accordance with relevant CMP decisions	Yes	
Did Belgium provide information in the NIR on changes in its reporting of the minimization of adverse impacts in accordance with Article 3, paragraph 14, of the Kyoto Protocol?	Yes	

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, CMP = Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol, CRF = common reporting format, ERT = expert review team, IPCC = Intergovernmental Panel on Climate Change, IPCC good practice guidance = IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, IPCC good practice guidance for LULUCF = IPCC *Good Practice Guidance for Land Use, Land-Use Change and Forestry*, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NIR = national inventory report, Revised 1996 IPCC Guidelines = *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*, UNFCCC reporting guidelines = "Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories".

[a] The assessment of completeness by the ERT considers only the completeness of reporting of mandatory categories (i.e. categories for which methods and default emission factors are provided in the Revised 1996 IPCC Guidelines, the IPCC good practice guidance or the IPCC good practice guidance for LULUCF).

B. Recommendations

99. The ERT identified the issues for improvement listed in table 9. All recommendations are for the next annual submission, unless otherwise specified. Where recommendations cannot be fully implemented in time for the 2015 annual submission, the ERT recommends that the Party provide an update on progress of implementation in the NIR.

Table 9
Recommendations identified by the expert review team

Sector	*Category/cross-cutting issue*	*Recommendation*	*Reiteration of previous recommendation?*	*Paragraph cross-references*
Cross-cutting	QA/QC	Ensure that any improvements to the QA/QC procedures are reflected in the actual QA/QC plan itself	Yes	12
	Inventory	Examine whether the inventory for a specific	No	16

Sector	*Category/cross-cutting issue*	*Recommendation*	*Reiteration of previous recommendation?*	*Paragraph cross-references*
	preparation	region, for categories where a tier 1 default method is used, could be improved by using the IEF for the same category in another region (or regions) as a country-specific EF for that category		
Energy	General	Further enhance the transparency of the NIR by including the full national energy balance for the latest reported year, outlining the final energy consumption by category	Yes	22
		Improve the consistency between the regional and federal energy balances	No	23
		Clearly document, in the NIR, any remaining differences between the regional and federal energy balances and provide explanations for these differences	Yes	23
	Comparison of the reference approach with the sectoral approach and international statistics	Describe the specific explanation for each year of the time series, if the difference between the reference approach and the sectoral approach exceeds 2 per cent	No	25
		Improve the consistency between the regional and federal energy balances	No	26
		Improve the consistency between the energy balances and the energy statistics reported internationally to Eurostat and IEA	No	26
	Stationary combustion: solid fuels – CO_2	Review, and if necessary, revise the low IEFs for solid fuels in iron and steel and in order to improve transparency, revise the description in the NIR of the category-specific QA/QC activities performed by explaining the links between the plant-specific AD from the EU ETS, the regional energy balances and the AD reported in the CRF tables	Yes	29
	Civil aviation: liquid fuels – CO_2, CH_4 and N_2O	Make efforts to make use of additional data sources and collaborate with Belgocontrol and/or Eurocontrol to improve the emission estimates	Yes	30
	Solid fuel transformation: solid fuels – CO_2	Include in the NIR the reason why the notation key "NA" has been reported and provide a brief explanation in the documentation box to CRF table 1.B.1	Yes	31
		Include an explanation of how fugitive emissions are controlled	No	31

Sector	*Category/cross-cutting issue*	*Recommendation*	*Reiteration of previous recommendation?*	*Paragraph cross-references*
Industrial processes and solvent and other product use	General	Correct the notation keys for AD	No	34
		Continue to improve the transparency of the NIR (e.g. for the iron and steel industry, semiconductor manufacturing and QA/QC procedures)	Yes	35
		Provide more detailed data on the methodologies and data sources for the AD and EFs for other (chemical industry) and consumption of halocarbons and F-gases in the semiconductor industry and other categories considered by the Party to be confidential	Yes	36
	Limestone and dolomite use – CO_2	Estimate the missing emissions and/or include the explanation provided to the ERT during the review in its NIR	No	37
	Iron and steel production – CO_2	Include information that all the incoming solid fuels in the blast furnace are included in the fuel consumption of iron and steel in the energy sector, as they are used for boilers in the iron and steel plants for energy purposes	No	38
	Production of halocarbons and SF_6 – PFCs	Include an explanation that the fugitive emissions are from a single chemical plant and occur when the waste gas incinerator used for abatement is out of order, which happens frequently, and also as a result of changes in the product mix of the plant	No	39
	Consumption of halocarbons and SF_6 – HFCs, PFCs and SF_6	Correct the notation keys	No	40
		Include information on the methodologies, AD and EFs used to estimate emissions from consumption of halocarbons and SF_6 and on the QA/QC procedures, while preserving confidentiality, as appropriate	Yes	41
		Include information on the models used to estimate fugitive and disposal emissions	No	42
		Describe all the methodological changes performed	No	43
	Soda ash production and use – CO_2	Transparently report the emissions allocated to the energy sector in the NIR	No	44
	Other (mineral products) – CO_2	Include an explanation for the significant variation in emissions due to the raw material mix used (carbon content in the raw material and the desired	No	45

Sector	*Category cross-cutting issue*	*Recommendation*	*Reiteration of previous recommendation?*	*Paragraph cross-references*
		ceramic end product)		
	Glass production – CO_2	Provide a clarification of the trend that can be mainly attributed to the Walloon Region and the changes in the share of glass type produced	No	46
Agriculture	General	Provide transparent explanations of the reasons for all recalculations made in the annual submission	No	49
		Provide the analysis of the key categories at the national level and apply the key category guidelines regarding the use of higher-tier methods for the key categories for all regions in Belgium	Yes	50
	Enteric fermentation – CH_4	Use a weighted average for the country-specific EFs for dairy and non-dairy cattle calculated for the Walloon and Flemish regions and apply it to the Brussels-Capital Region. Alternatively, if deemed more accurate, consider use of EFs from either the Flemish or the Walloon Region for the Brussels-Capital Region. In all cases, document the choice of EFs in the NIR	Yes	51
		Implement appropriate QA procedures in the future	No	52
	Manure management – CH_4 and N_2O	Consider use of EFs from either the Flemish or Walloon regions for the Brussels-Capital region. Document the choice of EFs in the NIR	Yes	53
		Include more detailed explanations of the country-specific EFs and other parameters used	No	54
		Correct the information and include a description of the AWMS used in the different regions in the NIR	No	55
		Estimate N_2O emissions from manure management for the Brussels-Capital Region using appropriate and consistent methods in accordance with the IPCC good practice guidance. Alternatively, if deemed more accurate, consider use of EFs from either the Flemish or Walloon Regions for the Brussels-Capital Region. In all cases, document the choice of EFs in the NIR	Yes	56
	Agricultural soils – N_2O	Increase the transparency of the reporting and include a detailed justification for the use of the region-specific fractions	No	57
		Increase the transparency of the calculation of $Frac_{LEACH}$ and the reporting, and include additional information on the calculation method	No	58
LULUCF	General	Implement a higher-tier method in the Flemish and	No	61

Sector	*Category/cross-cutting issue*	*Recommendation*	*Reiteration of previous recommendation?*	*Paragraph cross-references*
		Brussels-Capital Regions as soon as possible		
	Land converted to forest land – CO_2	Provide a reference to the parameter values applied to the IPCC default equations in order to estimate the carbon stock changes in living biomass	No	63
		Include clear references to the parameter values applied to estimate the carbon stock changes in the soil pool	No	64
	Cropland remaining cropland – CO_2	Document the assumptions regarding the land use	No	65
	Land converted to cropland – CO_2	Separately describe the processes causing the increasing area of cropland	No	66
		Include sufficient material to explain the trend in emissions and IEFs	No	67
	Settlements – CO_2	Include sufficient material to explain the trend in emissions and IEFs	No	68
Waste	General	Update the QA/QC plan and provide more information in the NIR	Yes	72
	Solid waste disposal on land – CH_4	Correct the time-lag values in the relevant CRF table	No	74
		Include, in the NIR, correct and relevant information and detailed explanations on the parameter values used in the calculations using the IPCC 2006 model	No	74
KP-LULUCF	Afforestation and reforestation – CO_2	Consider whether the conversion of other land to forest land is a directly human-induced conversion of land use	Yes	83
	Deforestation – CO_2	Include a clear explanation for the recalculations of emission estimates	No	84

Abbreviations: AD = activity data, AWMS = animal waste management system, CRF = common reporting format, EF = emission factor, ERT = expert review team, EU ETS = European Union Emissions Trading System, Eurostat = statistical office of the European Union, F-gas = fluorinated gas, $Frac_{LEACH}$ = fraction of nitrogen input to soils that is lost through leaching and run-off, IEA = International Energy Agency, IEF = implied emission factor, IPCC = Intergovernmental Panel on Climate Change, IPCC good practice guidance = IPCC *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*, KP-LULUCF = LULUCF emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol, LULUCF = land use, land-use change and forestry, NA = not applicable, NIR = national inventory report, QA/QC = quality assurance/quality control.

IV. Questions of implementation

100. No questions of implementation were identified by the ERT during the review.

Annex I

Information to be included in the compilation and accounting database

Table 10
Information to be included in the compilation and accounting database in t CO_2 eq for 2012, including the commitment period reserve

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Commitment period reserve	606 595 975	582 601 577		582 601 577
Annex A emissions for 2012				
CO_2	100 659 380			100 659 380
CH_4	6 392 291			6 392 291
N_2O	6 991 324			6 991 324
HFCs	2 140 194			2 140 194
PFCs	220 124			220 124
SF_6	117 002			117 002
Total Annex A sources[c]	**116 520 315**			**116 520 315**
Activities under Article 3, paragraph 3, for 2012				
3.3 Afforestation and reforestation on non-harvested land for 2012	–307 447			–307 447
3.3 Afforestation and reforestation on harvested land for 2012	NO			NO
3.3 Deforestation for 2012	498 949			498 949
Activities under Article 3, paragraph 4, for 2012[d]				
3.4 Forest management for 2012				
3.4 Cropland management for 2012				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2012				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2012				
3.4 Revegetation for the base year				

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, NO = not occurring.

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 13
Information to be included in the compilation and accounting database in t CO_2 eq for 2009

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2009				
CO_2	106 827 261			106 827 261
CH_4	6 580 660			6 580 660
N_2O	7 670 657			7 670 657
HFCs	1 916 351			1 916 351
PFCs	115 871			115 871
SF_6	97 719			97 719
Total Annex A sources[c]	**123 208 520**			**123 208 520**
Activities under Article 3, paragraph 3, for 2009				
3.3 Afforestation and reforestation on non-harvested land for 2009	–272 795			–272 795
3.3 Afforestation and reforestation on harvested land for 2009	NO			NO
3.3 Deforestation for 2009	499 308			499 308
Activities under Article 3, paragraph 4, for 2009[d]				
3.4 Forest management for 2009				
3.4 Cropland management for 2009				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2009				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2009				
3.4 Revegetation for the base year				

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, NO = not occurring.

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Table 14
Information to be included in the compilation and accounting database in t CO_2 eq for 2008

	As reported	*Revised estimates*	*Adjustment*[a]	*Final*[b]
Annex A emissions for 2008				
CO_2	119 452 549			119 452 549
CH_4	6 656 803			6 656 803
N_2O	7 582 214			7 582 214
HFCs	1 838 933			1 838 933
PFCs	202 084			202 084
SF_6	90 702	90 906		90 906
Total Annex A sources[c]	**135 823 286**	**135 823 490**		**135 823 490**
Activities under Article 3, paragraph 3, for 2008				
3.3 Afforestation and reforestation on non-harvested land for 2008	–261 320			–261 320
3.3 Afforestation and reforestation on harvested land for 2008	NO			NO
3.3 Deforestation for 2008	505 673			505 673
Activities under Article 3, paragraph 4, for 2008[d]				
3.4 Forest management for 2008				
3.4 Cropland management for 2008				
3.4 Cropland management for the base year				
3.4 Grazing land management for 2008				
3.4 Grazing land management for the base year				
3.4 Revegetation for 2008				
3.4 Revegetation for the base year				

Abbreviations: Annex A sources = source categories included in Annex A to the Kyoto Protocol, NO = not occurring.

[a] "Adjustment" is relevant only for Parties for which the expert review team has calculated one or more adjustment(s).

[b] "Final" includes revised estimates, if any, and/or adjustments, if any.

[c] The values for "Total Annex A sources" in the columns "As reported", "Revised estimates" and "Final" may not equal the sum of the values for the gases in those columns owing to rounding.

[d] Activities under Article 3, paragraph 4, are relevant only for Parties that elected one or more such activities.

Annex II

Documents and information used during the review

A. Reference documents

Intergovernmental Panel on Climate Change. *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html>.

Intergovernmental Panel on Climate Change. *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gl/invs1.htm>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gp/english/>.

Intergovernmental Panel on Climate Change. *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Available at <http://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.htm>.

"Guidelines for the preparation of national communications by Parties included in Annex I to the Convention, Part I: UNFCCC reporting guidelines on annual inventories". FCCC/SBSTA/2006/9. Available at <http://unfccc.int/resource/docs/2006/sbsta/eng/09.pdf>.

"Guidelines for the technical review of greenhouse gas inventories from Parties included in Annex I to the Convention". FCCC/CP/2002/8. Available at <http://unfccc.int/resource/docs/cop8/08.pdf>.

"Guidelines for national systems for the estimation of anthropogenic greenhouse gas emissions by sources and removals by sinks under Article 5, paragraph 1, of the Kyoto Protocol". Decision 19/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf# page=14>.

"Guidelines for the preparation of the information required under Article 7 of the Kyoto Protocol". Decision 15/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a02.pdf#page=54>.

"Guidelines for review under Article 8 of the Kyoto Protocol". Decision 22/CMP.1. Available at <http://unfccc.int/resource/docs/2005/cmp1/eng/08a03.pdf#page=51>.

Status report for Belgium 2014. Available at <http://unfccc.int/resource/docs/2014/asr/bel.pdf>.

Synthesis and assessment report on the greenhouse gas inventories submitted in 2014. Available at <http://unfccc.int/resource/webdocs/sai/2014.pdf>.

FCCC/ARR/2013/BEL. Report of the individual review of the annual submission of Belgium submitted in 2013. Available at <http://unfccc.int/resource/docs/2014/arr/bel.pdf>.

Standard independent assessment report template, parts 1 and 2. Available at <http://unfccc.int/kyoto_protocol/registry_systems/independent_assessment_reports/items/4061.php>.

B. Additional information provided by the Party

Responses to questions during the review were received from Mr. Olivier Biernaux (IRCEL-CELINE), including additional material on the methodology and assumptions used. The following documents[1] were also provided by Belgium:

Sébastien Bauwens. 2011. *Optimalisatie emissie-inventaris lucht: sector Landgebruik en verandering in landgebruik*. Liège: Gembloux Agro-Bio Tech.

ICEDD. 2014. *Bilan energetique de la wallonie 2012 bilan de l'industrie et bilan global*.

IBGE-BIM. 2014. *Greenhouse gases emissions inventory for the agriculture sector (CRF Table 4) in the Brussels-Capital Region (Belgium)*.

[1] Reproduced as received from the Party.

Annex III

Acronyms and abbreviations

AD	activity data
AWMS	animal waste management system
C	confidential
C_4F_{10}	perfluorobutane
C_6F_{14}	perfluorohexane
CDM	clean development mechanism
CH_4	methane
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
CO_2	carbon dioxide
CO_2 eq	carbon dioxide equivalent
CRF	common reporting format
EF	emission factor
ERT	expert review team
EU ETS	European Union Emissions Trading System
F-gas	fluorinated gas
FOD	first-order decay model
$Frac_{GASF}$	fraction of synthetic fertilizer nitrogen applied to soils that volatilizes as ammonia and nitorgen oxides
$Frac_{GASM}$	fraction of livestock nitrogen excretion that volatilizes as ammonia and nirogen oxides
$Frac_{LEACH}$	fraction of nitrogen input to soils that is lost through leaching and run-off
GHG	greenhouse gas; unless indicated otherwise, GHG emissions are the sum of CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 without GHG emissions and removals from LULUCF
ha	hectare
HFCs	hydrofluorocarbons
IEA	International Energy Agency
IEF	implied emission factor
IPCC	Intergovernmental Panel on Climate Change
ITL	international transaction log
KP-LULUCF	land use, land-use change and forestry emissions and removals from activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol
kt	kilotonne (1 kt = 1,000 tonnes)
LULUCF	land use, land-use change and forestry
N_2O	nitrous oxide
NA	not applicable
NE	not estimated
NIR	national inventory report
NO	not occurring
PFCs	perfluorocarbons
QA/QC	quality assurance/quality control
PJ	petajoule (1 PJ = 10^{15} joule)
RMU	removal unit
SEF	standard electronic format
SF_6	sulphur hexafluoride
SIAR	standard independent assessment report
SOC_{Forest}	soil organic carbon – forest

$SOC_{NonForestLand}$	soil organic carbon – non-forest land
SWDS	solid waste disposal site
t	tonne (1 t = 1,000 kg)
TJ	terajoule (1 TJ = 10^{12} joule)
UNFCCC	United Nations Framework Convention on Climate Change